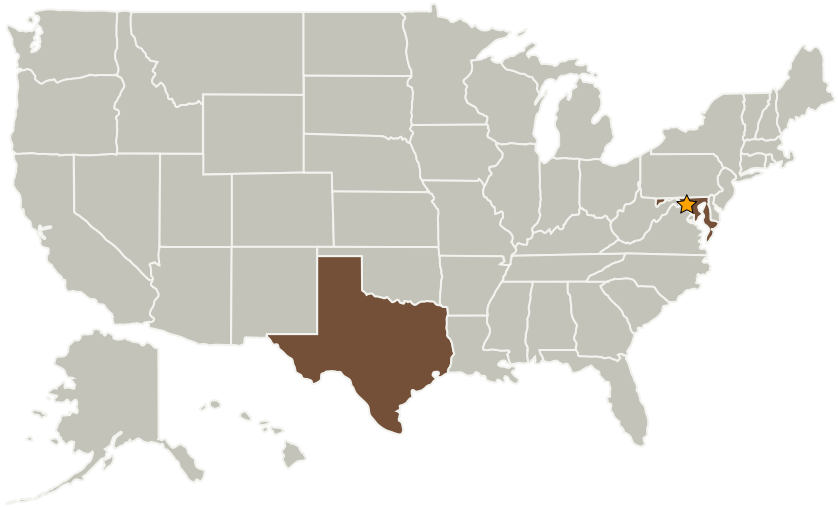
Plasmon-Enhanced Photonic Crystal Negative Index Materials for Superlensing Applications, Phase I

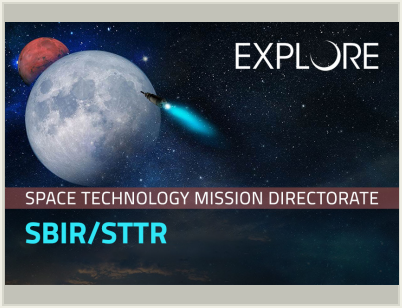
Completed Technology Project (2007 - 2008)

Project Introduction

Negative index materials (NIMs) offer tremendous potential for the formation of highly compact as well as large-area deployable thin-film optical components. Omega Optics and the University of Illinois at Urbana-Champaign (UIUC) propose to design and prototype photonic crystal (PC) based NIM optical components for space telescope and beam scanner applications. "Coating" metallic gratings on the surfaces of a polymeric photonic crystal NIM device will enable the strong coupling of surface plasmons with the PC based NIM, which may significantly enhance the capability of NIMs in device applications. With such plasmon-enhanced photonic crystal NIMs, Omega Optics and UIUC are particularly interested in building optical components such as NIM coating for chromatic aberration correction and NIM based field-of-view expander. The proposed optical components promise deployable form, reduced system dimensions, and lightweight single element optical devices with performances comparable to high cost multi-element design. They may also provide excellent noise-filtering capabilities for some space applications. Overall, NIMs offer the potential for paper-thin, deployable, complex lens structures, thus promising a breakthrough in optical devices and structures. To prove the feasibility of the proposed idea, optical components will be designed and fabricated during Phase I for proof-of-concept demonstrations. A fully-packaged device prototype will be developed during Phase II.

Primary U.S. Work Locations and Key Partners





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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Goddard Space Flight Center (GSFC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Goddard Space Flight Center(GSFC)	Lead Organization	NASA Center	Greenbelt, Maryland
Omega Optics, Inc.	Supporting Organization	Industry	Austin, Texas

Primary U.S. Work Locations	
Maryland	Texas

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
  - TX12.4 Manufacturing
    - TX12.4.3 Electronics and Optics Manufacturing Process